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THE UNIVERSITIES BOND ISSUE AND THE FUTURE FOR HIGHER EDUCATION IN ILLINOIS

On November 8 the voters of the State of Illinois will be asked to decide on the Universities Bond Issue, $195,000,000 for permanent improvements for the six state-owned universities in Illinois. The decision will affect higher education in the State for many years to come. Essentially, the choice is between having enough facilities to educate the increasing number of students who under present standards could and would attend college, or having to sharply restrict the number who will be given a college education.

Since Sputnik I, much has been said about more and better education. Now the voters of Illinois have a specific, concrete decision to make concerning higher education. They must decide if higher education requires additional support, and whether or not the Universities Bond Issue is the proper form for that support to take. Educators in Illinois hope that the voters will make this choice with the care and thoughtfulness that it deserves.

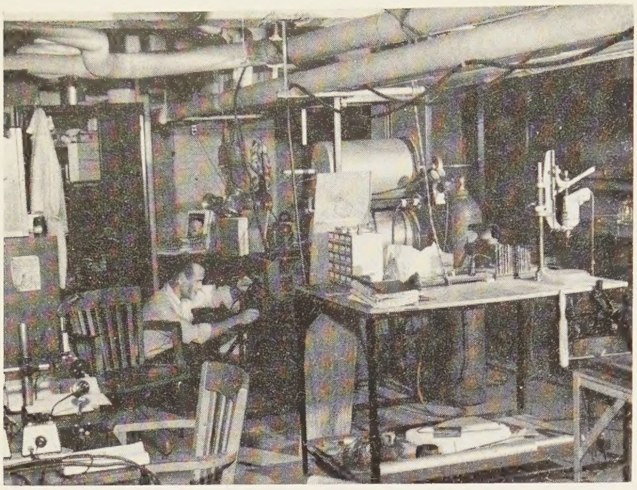
In a series of four articles since March, *Engineering Outlook* has presented some of the major space needs in the University of Illinois College of Engineering. The likelihood that these needs will be met will be much greater if the Universities Bond Issue passes. The first article told how the Physics Department for fifty years occupied a building in which laboratories finally had to be put in the attic and cellar, where students and researchers have to stoop under steam pipes or structural girders to move from one part of the laboratory to another. The article told how after fifty years the Physics Department was given half a building, and how the fate of the other half may depend heavily on the Universities Bond Issue.

The June *Outlook* told how the Electrical Engineering Department in 1945 requested a building to accommodate an undergraduate enrollment of 400. In 1949, they moved into a new building that represented *one-third* of the space requested for 400 students. The Department has had no further space added to its new building, even though enrollment in the spring of 1960 was 1,146 undergraduate students and 222 graduate students, about three times the enrollment which was ⅓ accommodated in 1949. The Universities Bond Issue will make funds possible for an addition to the Electrical Engineering Building.

The July issue of the *Outlook* told how the Aeronautical Engineering Department, with the largest undergraduate enrollment in aeronautical engineering in the United States, has never had a building of its own. Its offices are in the Transportation Building. Its laboratories are in the old Locomotive Laboratory and the old Machine Tool Laboratory, both buildings "inherited" from other departments after they were outmoded for their original purposes. Two Quonset huts at the University airport, six miles from the campus, are also used for laboratory space because equivalent space is not available on the campus. With such facilities the Aeronautical Engineering Department has the task of educating engineers to design and develop the aircraft and spacecraft so important to this nation's future. The passage of the Universities Bond Issue would bring a new Aeronautical Engineering Building nearer to realization.

The Civil Engineering Department, one of the largest in this field, is training its 612 undergraduate students and its 245 graduate students in Civil Engineering Hall, built in 1898. This is supplemented by space in 2 old houses, 2 Quonset huts, 1 converted house, one end of a temporary wooden shed, and "borrowed" space in Talbot Laboratory and the old Surveying Building. The only permanent structure occupied only by Civil Engineering is a small laboratory for sanitary engineering. Passage of the Universities Bond Issue would brighten hopes for a new Civil Engineering Building.

These are only some of the more pressing needs of the College of Engineering. Virtually every department is inadequately housed. Some are in the University's building plans for new buildings or additions to old, and some hope to get more space in old buildings as other departments move into new quarters. Funds in the Universities



Shortage of space in the old Physics Laboratory Building has forced the use of basement areas where research apparatus has to be fitted in among the steam pipes.

Bond Issue are not specifically allocated, but the needs outlined here have been recognized by the University as urgent. Passage of the Universities Bond Issue will bring these buildings much nearer to reality.

The University of Illinois College of Engineering has a high reputation among engineering schools. Through the years it has supplied Illinois and the nation with hundreds of well-trained and sorely needed engineers in many fields. More men with this kind and quality of training will be needed in the future. In fact, engineering enrollment at the University of Illinois has more than doubled since 1951 and the number of young people wanting engineering training will continue to grow. The crucial question is whether or not the voters will provide the facilities for training all the young people who have the desire and ability to be engineers, so that they can realize their own amibitions and meet the nation's need. November 8 is the time of decision.

EXPERIENCE BOWS TO THEORY — ALMOST

The interplay between experience and theory seems to take greater proportions each time an old machine component is redesigned. For example, recent Diesel engines, with their increased speeds and higher cylinder pressures, have shown older Diesel connecting rod designs to be lacking in reliability. An investigation of this problem was begun in 1958 under the direction of Professor E. I. Radzimovsky of the Mechanical Engineering Department.

It was obvious at the beginning of the study that increasing the cross-section of the connecting rod would increase its strength but would also increase the inertial forces, reducing the reliability even more. Therefore, "time proven" design features would have to be succeeded by new ideas if the resultant design was to fit present-day requirements. Carl S. Larson, a graduate assistant in Mechanical Engineering, has undertaken the study of important factors in connecting rod design such as rod geometry, bearing clearance and bearing cap rigidity. He is concentrating his work on the components of the rod assembly which might affect its reliability.

Although this project is sponsored only by the Mechanical Engineering Department and is somewhat limited in funds, it was necessary to build a machine to test the theories which were developed. A special test machine which would simulate the load conditions in an operating Diesel engine was designed, with important contributions being made by Professor D. F. Offner. A number of graduate students also worked on this project as part of their educational program.

The machine is now partly completed, but a great deal of work (completing the design and construction, calibration, and instrumentation) is still ahead before it is put into operation.

Regardless of initial plans, many problems arose in the design of the machine which could only be solved by the use of knowledge gained through experience — neither theory nor practical knowledge could survive alone. But the combination of empirical and theoretical methods is expected to bring forth a solution to the problem.

SELF HELP THROUGH ENGINEERING EDUCATION

The United States Government has recognized that the best way to fulfill one of the many responsibilities of world leadership is to help other countries raise their own standards of living. The International Cooperation Administration (I.C.A.) is the branch of government involved in this endeavor, and the University of Illinois is making a major effort to assist the I.C.A. in various educational programs for India. The College of Engineering has participated in this program since 1953.

There are two engineering programs of educational aid currently in operation at the University of Illinois, in addition to an extensive program in the field of agriculture. Under the Engineering Education Program, faculty members from various Indian engineering colleges visit the University to receive graduate training in their respective fields of engineering, as well as some instruction in undergraduate teaching methods, curriculum content, and college administration. These men, each of whom spends one year or more at the University, are all committed to teach engineering in India after their training is completed. Since 1958, 70 of them have been or are in this program, which is currently under the guidance of Professor T. W. Price of the Mechanical Engineering Department.

The other program has a longer history. Since 1954 the University has played an important role in the development of the Indian Institute of Technology in Kharagpur, West Bengal. Ten U. of I. engineering professors have helped with the development of this institution. In addition, one group just left recently for Kharagpur. It consisted of Julian Fellows and Francis Seyfarth, both Professors of Mechanical Engineering, Willis Emery, Professor of Electrical Engineering, and Henry Langhaar, Professor of Theoretical and Applied Mechanics.

The Indian Institute of Technology has been helped in other ways through this program. Twenty-three of the Institute faculty have been sent to Illinois for advanced training, and about three-quarters of a million dollars worth of equipment, purchased by the University with I.C.A. funds, has been supplied to the Institute. This program is under the supervision of Professor Ralph C. Hay, campus Coordinator of the University's International Cooperation Programs.

These programs of aid to India, completely financed by I.C.A., are excellent examples of the work done cooperatively by the government and the universities to aid other peoples through engineering education.

TEACHING TOMORROW'S TEACHERS

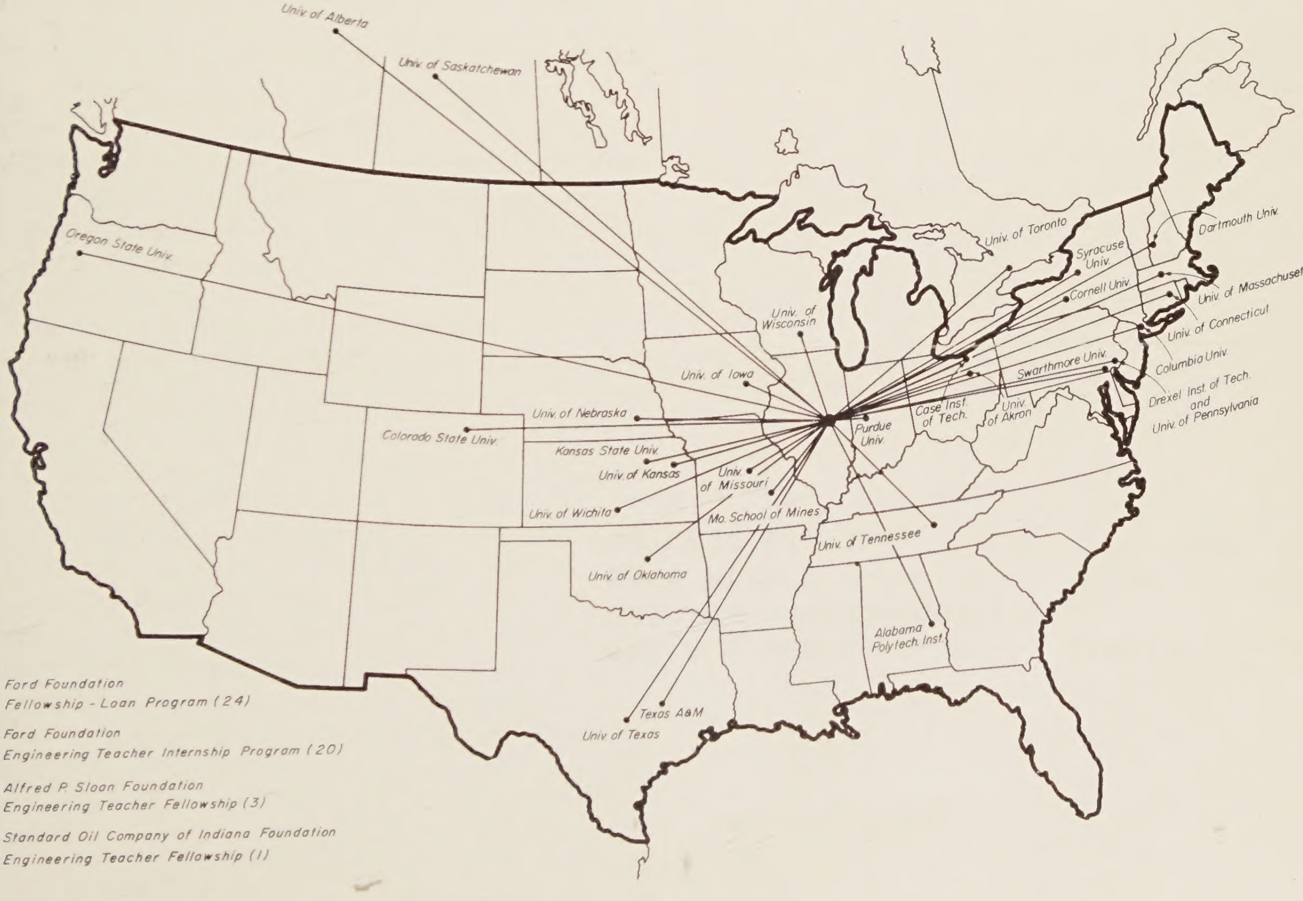
As enrollments in engineering classes increase each year, a problem almost as serious as the current need for engineers shows itself: the need for engineering teachers. Because of the University's efforts to solve this problem and the farsightedness of some industry foundations, there will be 48 graduate students on the engineering campus this fall working toward a career in engineering teaching through four separate programs.

The Illinois Intern Program, sponsored by a Ford Foundation grant, will allow 20 of these students to continue toward their goals. This group is made up of men with B.S. degrees who will spend four semesters in the program. In addition to course work, each intern attends a series of seminars on widely varied subjects and is given actual teaching experience in the classroom. In 1961 an additional ten men will be added to the present group of 20 interns.

Twenty-four of the 48 are sponsored by a separate Ford Foundation Fellowship-Loan Program. These men all have M.S. degrees, have had previous teaching experience, and are working toward Ph.D.'s.

The Alfred P. Sloan Foundation has established fellow-

This map shows where the engineering teacher-trainees received their bachelor degrees before entering their present programs at the University of Illinois.



ships for three of the teacher-trainees, all of whom have B.S. degrees and need advanced work to prepare them for teaching positions.

The remaining man, a Ph.D. candidate, is on a fellowship established by Standard Oil Foundation.

Students come from colleges all over the United States and Canada to participate in these programs. In fact, Professor Seichi Konzo of the Mechanical and Industrial Engineering Department points out that there is a long list of applicants awaiting an opportunity. Professor Konzo is not only the coordinator of the Illinois Intern Program, but also chairman of the reviewing committee which selects applicants for the other three programs. The other members of this committee are Professor Wendell E. Miller (Electrical Engineering), Professor C. P. Siess (Civil Engineering), and Professor J. O. Smith (Theoretical and Applied Mechanics).

Admission requirements are a high scholastic record, letters of recommendation from engineering instructors, and a strong interest in the engineering teaching profession. Course work involves meeting regular language requirements for the Ph.D. degree, taking advanced engineering courses, and fulfilling research requirements for the thesis.

These programs will have to be expanded or supplemented by other programs if the ever-growing demand for engineers is to be met. Obviously, an adequate supply of well-trained engineers cannot be furnished without an adequate number of well-qualified engineering teachers to train them.

LICENSES COMING AND GOING

There will not be any more seven-character combinations on Illinois vehicle license plates. Starting with the 1961 registrations, Illinois plates will carry a straight numerical sequence from 1 through 999,999, and will then switch to two letters followed by four numerals, such as AB 1234.

This change was based on recommendations made by traffic engineers of the University of Illinois. A study in cooperation with the office of Secretary of State was begun in 1958 to determine the proper functions of license plates, what information should be placed on plates, and the best methods of presenting this information. The study was directed by Professor John Baerwald.

The final report has just been published as Engineering Experiment Station Bulletin 457, *The Functions and Design of Motor Vehicle License Plates,* by John Baerwald, Delbert Karmeier, and Gordon Herrington. It contains 61 pages, 31 figures, and 33 tables.

The bulletin contains chapters on such topics as the functions of motor vehicle license plates, the vehicle registration number, the design of motor vehicle license plates, and the design of reflectorized license plates. It is available from the Engineering Publications Office at the cost of $1.25 per copy.

Recent Publications of the Engineering Experiment Station

Bulletin 457, *The Functions and Design of Motor Vehicle License Plates,* by John Baerwald, Delbert Karmeier, and Gordon Herrington, 61 pp., $1.25 per copy.

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